

REMARKS

The Office Action mailed June 7, 2005, has been received and reviewed. Claims 1 through 4, 7 through 28, 100 through 104, and 107 through 129 are currently pending in the application. Claims 1 through 4, 7 through 15, 100, 102 through 104, and 107 through 115 stand rejected. Claims 16 through 28, 101, and 116 through 129 are allowed. Claim 8 has been canceled and incorporated into claim 1. Claim 108 has been canceled and incorporated into claim 102. Claims 9 and 109 have been amended to correct dependency. Reconsideration is respectfully requested.

35 U.S.C. § 102(b) Anticipation Rejections

Anticipation Rejection Based on European Patent No. 0502647 A2 to Hata

Claims 1 and 10 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Hata (EP 0502647 A2). Applicant respectfully traverses this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Hata discloses a conductive structure comprising a substrate 10 having an aluminum line (18, 20) thereon. The aluminum line (18, 20) is encapsulated with titanium nitride (22, 24) and has tungsten sidewalls (28, 30, 32, 34). (Hata, Col. 3, lines 17-25).

By way of contrast, claim 1 of the presently claimed invention recites a “metallization structure for a semiconductor device, comprising: a substrate comprising a substantially planar upper surface; and a conductive line for transmitting a signal laterally across the substrate, the conductive line consisting essentially of: a metal layer defining a pattern on a portion of the substrate upper surface; a single conducting layer overlying and substantially coextensive with the metal layer, the metal layer and the single conducting layer having substantially aligned sidewalls and the single conducting layer defining an upper surface of the conductive line, the single conducting layer selected from the group consisting of aluminum and copper; and metal

spacers flanking and extending at least substantially to a height of the sidewalls of the single conducting layer and metal layer.” Applicant respectfully submits that Hata fails to disclose, either expressly or inherently, [an aluminum or copper] “single conducting layer having substantially aligned sidewalls and the single conducting layer defining an upper surface of the conductive line.” Instead, Hata discloses an aluminum line (18, 20) encapsulated by titanium nitride (22, 24). As Hata fails to disclose every element of the presently claimed invention, Hata cannot anticipate claim 1. Accordingly, claim 1 of the presently claimed invention is allowable.

Claim 10 is allowable as depending from allowable claim 1.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on European Patent No. 0502647 A2 to Hata as applied to claims 1 and 10 above, and further in view of U.S. Patent No. 6,281,115 to Chang et al.

Claims 2, 3, 100, 102, 103 and 110 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hata (EP 0502647 A2) in view of Chang et al. (U.S. Patent No. 6,281,115). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The discussion of Hata above is incorporated herein. Chang discloses a structure including a substrate 1 having an insulating layer 2 thereon. Interconnect metal structures 3 are located on the insulated layer 2 and enveloped by low dielectric constant layer 4a. An aperture 5 in low dielectric constant layer 4a is lined with insulator layer 6a. (Chang, Fig. 3, Fig. 7) Chang clearly fails to cure the deficiencies of Hata.

With respect to dependent claims 2, 3 and 100, the Court of Appeals for the Federal Circuit has stated that “dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious.” In re Fine, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). See also MPEP § 2143.03. Having failed to teach or suggest each and every limitation of the independent claims, the prior art referenced as rendering dependent claims 2, 3 and 100 obvious, cannot serve as a basis for rejection.

Claim 102 of the presently claimed invention is allowable for at least the same reasons as set forth with respect to claim 1. The proposed combination of references fails to teach or suggest a “structure for transmitting a signal across a semiconductor device, the structure comprising: a substrate comprising a substantially planar upper surface; and a conductive line extending over the upper surface and isolated therefrom by a dielectric layer at least underlying the conductive line, the conductive line consisting essentially of: a metal layer above the dielectric layer, the metal layer defining a pattern on a portion of the substrate upper surface; a single conducting layer overlying and substantially coextensive with the metal layer, the metal layer and the single conducting layer having substantially aligned sidewalls, wherein an upper surface of the single conductive layer defines an upper surface of the conductive line the single conducting layer selected from the group consisting of aluminum and copper; and metal spacers flanking and extending at least substantially to a height of the sidewalls of the single conducting layer and metal layer” as recited in independent claim 102 of the presently claimed invention.

Applicant respectfully asserts that the proposed combination fails to teach or suggest the claim limitation of [an aluminum or copper] “single conducting layer having substantially aligned sidewalls and the single conducting layer defining an upper surface of the conductive line.” Instead, Hata discloses an aluminum line (18, 20) encapsulated by titanium nitride (22, 24). Chang also lacks any teaching or suggestion of an underlying metal layer. Chang discloses an interconnect 3 directly on a dielectric layer 2 and lacks any spacers. (Chang, Fig. 3). Thus, Chang cannot correct the deficiencies of Hata. Thus, applicant respectfully asserts that the proposed combination of references fail to teach or suggest all the claim limitations of claim 102 of the presently claimed invention to establish a *prima facie* case of obviousness under 35 U.S.C. § 103. Accordingly, claim 102 is allowable.

Claims 103 and 110 are each allowable as depending, either directly or indirectly, from allowable claim 102.

Obviousness Rejection Based on European Patent No. 0502647 A2 to Hata as applied to claims 1 and 10 above, and further in view of U.S. Patent No. 6,166,439 to Cox

Claims 4 and 7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hata (EP 0502647 A2) as applied to claims 1 and 10 above, and further in view of Cox (U.S. Patent No. 6,166,439). Applicant respectfully traverses this rejection, as hereinafter set forth.

With respect to dependent claims 4 and 7, the Court of Appeals for the Federal Circuit has stated that “dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious.” In re Fine, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). See also MPEP § 2143.03. Having failed to teach or suggest each and every limitation of the independent claims, the prior art referenced as rendering dependent claims 4 and 7 obvious, cannot serve as a basis for rejection.

Further, applicant respectfully disagrees that Cox teaches or suggests that a metal layer defining a pattern on a portion of the substrate upper surface and underlying a single conducting layer as recited in claim 1 of the presently claimed invention comprises Ti, Ta, W, Co or Mo or alloys or compounds thereof, including TaN or TiN. Instead, Cox discloses a conductive line 58 disposed on insulating material 50a. Neither Hata nor Cox teach or suggest the existence of a metal layer underlying the [aluminum or copper] “single conducting layer” as recited in claim 1 of the presently claimed invention. Accordingly, claims 4 and 7 are further allowable.

Obviousness Rejection Based on European Patent No. 0502647 A2 to Hata as applied to claims 1 and 10 above, and further in view of U.S. Patent No. 6,285,082 to Joshi et al.

Claims 8 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hata (EPO 0502647 A2) as applied to claims 1 and 10 above, and further in view of Joshi et al. (U.S. Patent No. 6,285,082). Applicant respectfully traverses this rejection, as hereinafter set forth.

Claim 8 has been canceled. With respect to dependent claim 9, the Court of Appeals for the Federal Circuit has stated that “dependent claims are nonobvious under section 103 if the

independent claims from which they depend are nonobvious.” In re Fine, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). See also MPEP § 2143.03. Having failed to teach or suggest each and every limitation of the independent claims, the prior art referenced as rendering dependent claim 9 obvious, cannot serve as a basis for rejection.

Obviousness Rejection Based on European Patent No. 0502647 A2 to Hata as applied to claims 1 and 10 above, and further in view of U.S. Patent No. 6,277,745 to Liu et al.

Claims 11 and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hata (EPO 0502647 A2) as applied to claims 1 and 10 above, and further in view of Liu et al. (U.S. Patent No. 6,277,745). Applicant respectfully traverses this rejection, as hereinafter set forth.

With respect to dependent claims 11 and 15, the Court of Appeals for the Federal Circuit has stated that “dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious.” In re Fine, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). See also MPEP § 2143.03. Having failed to teach or suggest each and every limitation of the independent claims, the prior art referenced as rendering dependent claims 11 and 15 obvious, cannot serve as a basis for rejection.

Obviousness Rejection Based on European Patent No. 0502647 A2 to Hata as applied to claims 1 and 10 above, and further in view of U.S. Patent No. 6,677,647 to Dawson

Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hata (EP 0502647 A2) as applied to claims 1 and 10 above, and further in view of Dawson (U.S. Patent No. 6,677,647). Applicant respectfully traverses this rejection, as hereinafter set forth.

With respect to dependent claim 12, the Court of Appeals for the Federal Circuit has stated that “dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious.” In re Fine, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). See also MPEP § 2143.03. Having failed to teach or suggest each and every limitation of the independent claims, the prior art referenced as rendering dependent claim 12 obvious, cannot serve as a basis for rejection.

Obviousness Rejection Based on European Patent No. 0502647 A2 to Hata in view of U.S. Patent No. 6,677,647 to Dawson, as applied to claim 12 above, and further in view of U.S. patent No. 6,046,502 to Matsuno

Claims 13 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hata (EP 0502647 A2) in view of Dawson (U.S. Patent No. 6,677,647), as applied to claim 12 above, and further in view of Matsuno (U.S. Patent No. 6,046,502). Applicant respectfully traverses this rejection, as hereinafter set forth.

With respect to dependent claims 13 and 14, the Court of Appeals for the Federal Circuit has stated that “dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious.” In re Fine, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). See also MPEP § 2143.03. Having failed to teach or suggest each and every limitation of the independent claims, the prior art referenced as rendering dependent claims 13 and 14 obvious, cannot serve as a basis for rejection.

Obviousness Rejection Based on European Patent No. 0502647 A2 to Hata in view of U.S. Patent No. 6,281,115 to Chang et al. as applied to claims 2, 3, 100, 102, 103 and 110 above, and further in view of U.S. Patent No. 6,166,439 to Cox

Claims 104 and 107 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hata (EP 0502647 A2) in view of Chang et al. (U.S. Patent No. 6,281,115), as applied to claims 2, 3, 100, 102, 103 and 110 above, and further in view of Cox (6,166,439). Applicant respectfully traverses this rejection, as hereinafter set forth.

With respect to dependent claims 104 and 107, the Court of Appeals for the Federal Circuit has stated that “dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious.” In re Fine, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). See also MPEP § 2143.03. Having failed to teach or suggest each and every limitation of the independent claims, the prior art referenced as rendering dependent claims 104 and 107 obvious, cannot serve as a basis for rejection.

Further, applicant respectfully disagrees that Cox teaches or suggests that a metal layer defining a pattern on a portion of the substrate upper surface and underlying a single conducting layer as recited in claim 102 of the presently claimed invention comprises Ti, Ta, W, Co or Mo or alloys or compounds thereof, including TaN or TiN. Instead, Cox discloses a conductive line 58 disposed on insulating material 50a. Neither Hata, Chang nor Cox teach or suggest the existence of a metal layer underlying the [aluminum or copper] “single conducting layer” as recited in claim 102 of the presently claimed invention. Accordingly, claims 4 and 7 are further allowable.

Obviousness Rejection Based on European Patent No. 0502647 A2 to Hata in view of U.S. Patent No. 6,281,115 to Chang et al. as applied to claims 2, 3, 100, 102, 103 and 110 above, and further in view of U.S. Patent No. 6,285,082 to Joshi et al.

Claims 108 and 109 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hata (EP 0502647 A2) in view of Chang et al.(U.S. Patent No. 6,281,115), as applied to claims 2, 3, 100, 102, 103 and 110 above, and further in view of Joshi et al.(U.S. Patent No. 6,285,082). Applicants respectfully traverses this rejection, as hereinafter set forth.

Claim 108 has been canceled. With respect to dependent claim 109, the Court of Appeals for the Federal Circuit has stated that “dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious.” In re Fine, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). See also MPEP § 2143.03. Having failed to teach or suggest each and every limitation of the independent claims, the prior art referenced as rendering dependent claim 109 obvious, cannot serve as a basis for rejection.

Obviousness Rejection Based on European Patent No. 0502647 A2 to Hata in view of U.S. Patent No. 6,281,115 to Chang et al. as applied to claims 2, 3, 100, 102, 103 and 110 above, and further in view of U.S. Patent No. 6,277,745 to Liu et al.

Claims 111 and 115 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hata (EP 0502647 A2) in view of Chang et al.(U.S. Patent No. 6,281,115) as applied to claims 2, 3, 11, 102, 103 and 110 above, and further in view of Liu et al. (U.S. Patent No. 6,277,745).

Applicant respectfully traverses this rejection, as hereinafter set forth.

With respect to dependent claims 111 and 115, the Court of Appeals for the Federal Circuit has stated that “dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious.” In re Fine, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). See also MPEP § 2143.03. Having failed to teach or suggest each and every limitation of the independent claims, the prior art referenced as rendering dependent claims 111 and 115 obvious, cannot serve as a basis for rejection.

Obviousness Rejection Based on European Patent No. 0502647 A2 to Hata in view of U.S. Patent No. 6,281,115 to Chang et al. as applied to claims 2, 3, 100, 102, 103 and 110 above, and further in view of U.S. Patent No. 6,677,647 to Dawson

Claim 112 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Hata (EP 0502647 A2) in view of Chang et al.(U.S. Patent No. 6,281,115) as applied to claims 2, 3, 11, 102, 103 and 110 above, and further in view of Dawson (U.S. Patent No. 6,677,647). Applicant respectfully traverses this rejection, as hereinafter set forth.

With respect to dependent claim 112, the Court of Appeals for the Federal Circuit has stated that “dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious.” In re Fine, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). See also MPEP § 2143.03. Having failed to teach or suggest each and every limitation of the independent claims, the prior art referenced as rendering dependent claim 112 obvious, cannot serve as a basis for rejection.

Obviousness Rejection Based on European Patent No. 0502647 A2 to Hata in view of U.S. Patent No. 6,281,115 to Chang et al. in view of U.S. Patent No. 6,677,647 to Dawson as applied to claim 112, and further in view of U.S. Patent No. 6,046,502 to Matsuno

Claims 113 and 114 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hata (EP 0502647 A2) in view of Chang et al.(U.S. Patent No. 6,281,115) in view of Dawson (U.S. Patent 6,677,647) as applied to claim 112 above, and further in view of Matsuno (U.S. Patent No. 6,046,502). Applicant respectfully traverses this rejection, as hereinafter set forth.

With respect to dependent claims 113 and 114, the Court of Appeals for the Federal Circuit has stated that "dependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious." In re Fine, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). See also MPEP § 2143.03. Having failed to teach or suggest each and every limitation of the independent claims, the prior art referenced as rendering dependent claims 113 and 114 obvious, cannot serve as a basis for rejection.

ENTRY OF AMENDMENTS

The amendments to the claims above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Further, the amendments do not raise new issues or require a further search.

CONCLUSION

Claims 1-4, 7, 9-28, 100-104, 107, and 109-129 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Office determine that additional issues remain which might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,



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Date: September 6, 2005
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